

REMARKS

Claims 10-21 are pending in this application.

Applicants have amended claims 10, 16, 17, and 21. The changes to the claims made herein do not introduce any new matter.

Claim Amendments

Applicants have amended the claims to clarify the claimed subject matter. In particular, Applicants have amended independent claims 10 and 17 to specify a “liquid” rather than a “fluid.”

Double Patenting Rejections

Applicants acknowledge the obviousness-type double patenting rejections entered in the Final Office Action. As each of these rejections is a *provisional* rejection, Applicants will take appropriate action once the subject application has been indicated to be otherwise in condition for allowance.

Rejections Under 35 U.S.C. § 103

Applicants respectfully request reconsideration of the rejection of claims 10, 16, 17, and 21 under 35 U.S.C. § 103(a) as being unpatentable over *Yun et al.* (U.S. Patent Publication No. 2006/0124153) in view of *Mertens et al.* (WO 99/16109). As will be explained in more detail below, the obviousness rejection is improper because the *Yun et al.* reference is not available as prior art against the subject application.

The *Yun et al.* reference, which was published on June 15, 2006, qualifies as prior art against the subject application under 35 U.S.C. § 102(e) because it is a continuation-in-part of a prior application, which was filed on September 30, 2002. As set forth in 35 U.S.C. § 103(c), subject matter that qualifies as prior art only under 35 U.S.C. § 102(e) does not preclude patentability under section 103 “where the subject matter and the claimed invention were, at the time the claimed invention was made, owned by the same person or subject to an

obligation of assignment to the same person.” In the present situation, both the *Yun et al.* reference and the subject application are owned by Lam Research Corporation. Further, at the time the claimed subject matter was made, the inventors were under an obligation to assign the claimed subject matter to Lam Research Corporation. In this regard, Applicants’ undersigned representative notes that an assignment from the inventors to Lam Research Corporation was concurrently submitted with the subject application on March 31, 2004. Thus, pursuant to 35 U.S.C. § 103(c), the *Yun et al.* reference is not available as section 103 prior art against the subject application.

Accordingly, Applicants respectfully submit that the rejection of claims 10, 16, 17, and 21 under 35 U.S.C. § 103(a) as being unpatentable over *Yun et al.* in view of *Mertens et al.* is improper and should be withdrawn.

Applicants respectfully request reconsideration of the rejection of claims 10, 16, 17, and 21 under 35 U.S.C. § 103(a) as being unpatentable over *de Larios et al.* (U.S. Patent No. US 6,488,040 B1) in view of *Mertens et al.* As will be explained in more detail below, the combination of *de Larios et al.* and *Mertens et al.* would not have suggested to one having ordinary skill in the art the subject matter defined in independent claims 10 and 17, as presented herein.

In formulating the obviousness rejection, the Examiner admits that the *de Larios et al.* reference does not disclose or suggest a proximity head including a heated portion. The Examiner alleges, however, that it would have been obvious to modify the proximity head of *de Larios et al.* to include the heating portion and thermocouple-thermometer shown by *Mertens et al.* Applicants respectfully traverse.

The *Mertens et al.* reference discloses a method and apparatus for removing a liquid from the surface of a rotating substrate. In the disclosed method, the substrate is subjected to rotary movement, a liquid is *sprayed* onto the surface of the substrate through a set of nozzles

5 in a movable arm 3, and the substrate is locally heated by applying a heated gas and/or vapor from a *separate* nozzle 4 in the movable arm 3, while the liquid is being supplied to create a sharply defined liquid-ambient boundary by locally reducing the surface tension of the liquid. The *separate* heated gas/vapor nozzle 4 directs the heated gas/vapor toward the liquid on the surface of the substrate to heat the liquid and locally heat the surface of the substrate to reduce the surface tension of the liquid (see page 4, lines 6-10). Further, at page 11, lines 12-27, *Mertens et al.* teach heating N₂ gas with one nozzle and using the nozzle to direct the heated N₂ to drive off more of the liquid. The reduced surface tension liquid is then driven off the edge of the substrate by a combination of the spinning action of the substrate and the force of the heated gas blowing the liquid away from the center of the substrate.

Mertens et al. does not teach a proximity head as specified in the claimed subject matter. For example, the *Mertens et al.* nozzles 4 and 5 are located within movable arm 3. In contrast, the claimed proximity head includes a bottom surface that has at least one outlet port and at least one inlet port opening to a fluid meniscus. The *Mertens et al.* device has no bottom surface that includes the nozzles 4 and 5 and therefore nozzles 4 and 5 are neither the same as nor similar to the claimed outlet port and inlet port. Further, the *Mertens et al.* device does not include a nozzle that draws liquid away from the surface of the substrate analogous to the inlet port of the claimed subject matter. In contrast, *Mertens et al.* relies on the heated gas and or vapor to drive the liquid off the edge of the substrate as the nozzles 4 and 5 are moved from the center portion of the substrate out to the edge of the substrate.

Further, *Mertens et al.* does not teach heating the liquid in the movable arm 3 before the liquid is supplied through the nozzles 5 to the surface of the substrate. Instead, *Mertens et al.* teaches heating the liquid *after* it is on the surface of the substrate. At page 11, lines 12-27, *Mertens et al.* teach using a simple heater equipped with a thermocouple-thermometer to heat the N₂ gas before directing the heated N₂ gas toward the surface of the substrate.

Mertens et al. do not teach heating the liquid before directing the liquid to the surface of the substrate. In fact, *Mertens et al.* teach 1) *not heating* the liquid until it reaches the surface of the substrate so that the heated gas can be used to reduce the surface tension *at that point*, 2) that the heating must be sufficiently localized (see page 4, lines 10-12), 3) that the heated local area be selectively and controllably moved so as to drive the liquid off the edge of the substrate (see page 9, lines 6-7, and page 9, line 36 through page 10, line 7), and 4) that heating the liquid before spraying it on the substrate through the nozzles 5 would not be localized heating but generally heating all over the surface of the substrate. Further, it is noted that *Mertens et al.* teach that the N₂ gas was heated only to about 50 degrees C and as this is only moderately heated related to typical ambient temperatures of around 25 degrees C, it is important that the liquid that is supplied through nozzles 5 is *not heated* before reaching the surface of the substrate so that the moderately heated N₂ gas can at that point and time heat the liquid on the surface of the substrate sufficient to substantially change the surface tension of the liquid.

Further still, *Mertens et al.* teach that the liquid supplied through nozzles 5 to the surface of the substrate is "sprayed continuously" (see page 3, line 29). The claimed subject matter does not involve spraying the liquid to the substrate but rather supplies the liquid to the liquid meniscus supported between the bottom surface of the proximity head and a surface of a semiconductor wafer. Spraying would disrupt the liquid meniscus that the claimed subject matter is supporting between the bottom surface of the proximity head and the surface of the substrate.

Lastly, *Mertens et al.* teach a meniscus that is simply a layer of liquid on the surface of the substrate. A meniscus is a curved surface of a quantity of liquid that is extended between the surfaces of a container that contains the quantity of liquid. For example, considering the case of a common drinking straw, liquid in the straw has a curved surface that curves from

one inside wall of the straw to another. In another example, if a water drop is placed on a solid surface, the top surface of the water drop is curved from the solid surface on a first side of the water drop, over the top of the water drop to the solid surface on a second side of the water drop. The meniscus to which *Mertens et al.* refer is the curved top surface of the liquid residing on the substrate. In contrast, the claimed subject matter involves a liquid meniscus supported between the bottom surface of the proximity head and a surface of a semiconductor wafer and the curved portion of the meniscus extends from where the liquid contacts the bottom surface of the proximity head to where the meniscus contact the surface of the substrate. Accordingly, the meniscus referred to by *Mertens et al.* is neither the same as nor suggestive of that specified in the claimed subject matter because *Mertens et al.* does not teach that the liquid meniscus is supported between the bottom surface of the proximity head and a surface of a semiconductor wafer.

In view of the foregoing, the *Mertens et al.* reference discloses a device that is significantly different, in terms of both structure and operation, from the proximity heads shown by *de Larios et al.* Moreover, the *Mertens et al.* reference teaches away from any heating of the liquid before it is directed to the surface of the substrate. As such, the *Mertens et al.* reference would not have provided one having ordinary skill in the art with any suggestion or motivation to modify the proximity head of *de Larios et al.* in the manner proposed by the Examiner. As such, the combination of *de Larios et al.* in view of *Mertens et al.* would not have suggested to one having ordinary skill in the art the claimed subject matter.

Accordingly, for at least the foregoing reasons, claims 10, 16, 17, and 21, as amended herein, are patentable under 35 U.S.C. § 103(a) over the combination of *de Larios et al.* in view of *Mertens et al.*

Applicants respectfully request reconsideration of the rejection of claims 11-14, 18, and 19 under 35 U.S.C. § 103(a) as being unpatentable over *Yun et al.* or *de Larios et al.* in view of *Mertens et al.*, and further in view of *Kawamura et al.* (U.S. Patent No. 5,696,348). Each of claims 11-14, 18, and 19 depends from either claim 10 or claim 17. As discussed above, the *Yun et al.* reference is not available as section 103 prior art against the subject application. Further, the *Kawamura et al.* reference does not cure the above-discussed deficiencies of the combination of the *de Larios et al.* and *Mertens et al.* references relative to the subject matter defined in claims 10 and 17, as amended herein. Accordingly, claims 11-14, 18, and 19 are patentable under 35 U.S.C. § 103(a) over *Yun et al.* or *de Larios et al.* in view of *Mertens et al.*, and further in view of *Kawamura et al.* for at least the reason that these claims depend from claim 10 or claim 17.

Conclusion

In view of the foregoing, Applicants respectfully request reconsideration and reexamination of claims 10-21, as amended herein, and submit that these claims are in condition for allowance. In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at (408) 749-6902. If any additional fees are due in connection with the filing of this paper, then the Commissioner is authorized to charge such fees to Deposit Account No. 50-0805 (Order No. LAM2P451).

Respectfully submitted,
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